LOUISIANA
DEPARTMENT OF
WILDLIFE AND FISHERIES

1984
ANNUAL REPORT

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Annual Report 1984

Louisiana Department of
Wildlife and Fisheries

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A MESSAGE FROM THE SECRETARY

This annual report to the Governor and members of the Louisiana Legislature describes the many ongoing programs and responsibilities of the Department of Wildlife and Fisheries intended to enhance, protect, perpetuate and properly harvest the state's bountiful wildlife and fisheries resources.

The diversity and abundance of Louisiana's renewable wildlife resources are without equal in these United States and quite possibly the world. We lead the nation in the harvest of seafood, waterfowl and furbearing animals, just to name a few.

An independent study, released in 1984, put a price tag on the economic impact of licensed Louisiana recreational saltwater fisherman at over a half-billion dollars annually. This figure does not take in freshwater recreational fishing activity, nor does it consider the impact of that host of Louisiana fishermen who are not required to have a license to fish (under 16, 60 and over, and canepole fishermen).

These figures are only the latest in a long line of mind-boggling economic impact figures attributed directly to wildlife and fisheries resources. A much harder to measure, but no less important, aspect of this state's wildlife heritage is its effect on the quality of life. Personally, the enjoyment and fond memories that out-of-doors activities have added to my life are priceless.

As the watchdog agency over these resources that are so important to the livelihood and enjoyment of Louisiana's citizens, I can assure you that we take our job seriously. I have said it many times and I will repeat it again, Louisiana is blessed with some of the top biological scientist in the world. People on our staff are recognized all over the world for their contributions to the field.

Granted, this state is blessed with wildlife habitat unparalleled on this continent, but if you look at the history of wildlife in the state you will realize that good habitat alone isn't enough. The alligator, deer, turkey and even our state bird, the brown pelican, are examples of species restored to the state as a direct result of research and action by the biologists and wildlife agents that make up this department.

The fact that we continue today to enjoy such a bounty of wildlife is, I believe, no accident. As you read the detailed descriptions of the broad and diversified programs of this department, please keep this in mind.

Calendar year 1984 was a good year for wildlife in Louisiana and in this short opening message, I won't repeat what you will find later in this report; instead , I will comment briefly on three specific things that contributed to 1984 being such a banner year.

The first of these is passage by the 1984 Louisiana Legislature of Act 295 and companion legislation that grew out of the special Governor's Finfish Task Force and the subsequent formation of the Finfish Management Section within the existing Seafood Division. Details of these activities can be found in the section of this report dealing with the Office of Coastal and Marine Resources.

The second occurrence of last year that I believe bodes especially well for wildlife in the state is the establishment of the private non-profit Operation Game Thief program and a sister state-supported Louisiana Help Our Wildlife Program that was contained in Act 724 of the 1984 Legislature. Both programs foster improved enforcement of our wildlife laws within the state by offering cash rewards to citizens for reporting violations.

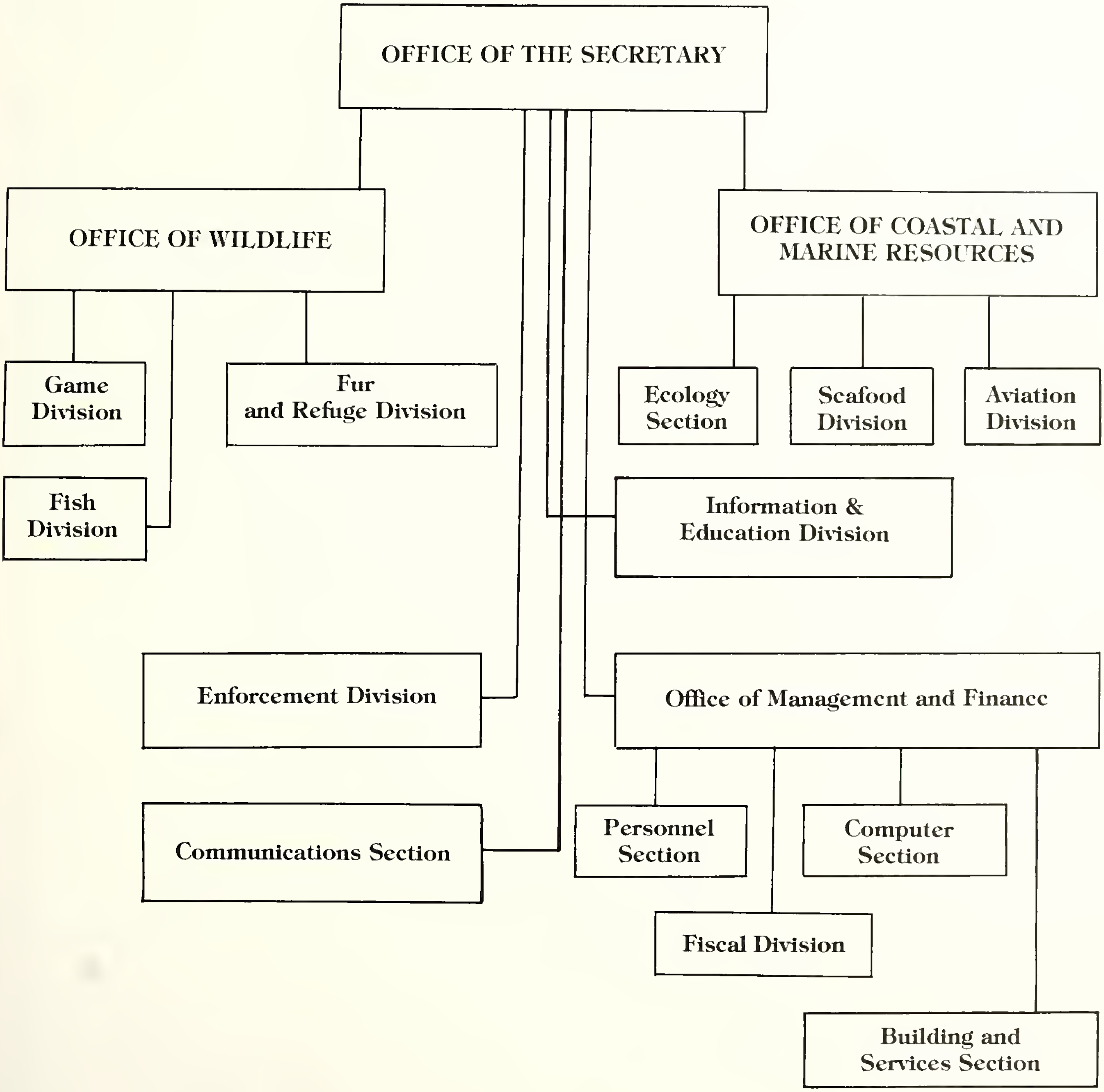
I can happily report that Operation Game Thief has been very successful and that a number of major wildlife cases can be directly attributed to tips received through the program. A toll-free number (1-800-442-2511) for reporting wildlife violations has been established and well publicized and calls come in daily. The funds available under the Louisiana Help Our Wildlife Program will be a big boost to the program. These funds are generated by a $5 fee added to the court cost of convicted wildlife violators. Wildlife violators are thereby indirectly paying cash rewards to citizens for reporting other violators. That is my kind of program.

The last thing I wish to mention is the department's aggressive on-going land acquisition program. Two parcels of land totaling a shade over 10,499 acres to be set aside forever as wildlife habitat and for recreational uses by nature lovers and sportsmen were purchased in 1984.

One of the purchases was a 4,878-acre tract of bottomland hardwoods adjoining the Big Lake Wildlife Management Area in Tensas, Madison and Franklin parishes. An option was taken on this land when the state purchased the 9,823-acre WMA in 1983. The other tract, a 5,621-acre parcel of land known as the Anderson Farms Tract in Ouachita Parish, links the existing Russell Sage and Ouachita Wildlife Management areas and creates a single 25,885-acre WMA. Besides providing more land for recreational purposes, the consolidation will permit more effective management and operating efficiencies.

In closing, I hope you will take time to digest the information contained in this annual report. Only then will you begin to have a full appreciation of the expanse of our work.

ADMINISTRATIVE STRUCTURE CHART



Office of the Secretary

The secretary, as chief administrative officer of the Department of Wildlife and Fisheries, is responsible for all wildlife and fisheries resource management activities in Louisiana. He is also deeply involved in vital conservation matters on both national and international levels.

Administration of the Office of Management and Finance, the Enforcement Division, the Information and Education Division and the Communications Section is directly in the Office of the Secretary, while the administration of the other major divisions, Game, Fish, Fur and Refuge and Seafood Divisions and Aviation and Ecology Sections, is delegated to assistant secretaries.

The secretary is assisted in the administration of the department by a deputy secretary, who is chiefly involved in the management of the various offices and divisions with the Office of the Secretary.

Within the structure of the Office of the Secretary, the Office of Management and Finance, which includes the Fiscal Division and the Personnel, Building and Services, and Computer Sections, is administered by the undersecretary.

Enforcement Division

The Enforcement Division is responsible for enforcing all laws enacted by the Louisiana Legislature relative to wildlife and fisheries resources, applicable portions of the state's Boating Act, and federal regulations pertaining to migratory wildlife and endangered species.

The ultimate goal of the Enforcement Division has always been to ensure the perpetuation of Louisiana's wildlife and fisheries resources. To accomplish this goal, Enforcement Division employees work in close cooperation with employees of other divisions within the agency who are charged with the responsibility of developing and administering technical programs.

In times of emergency or natural disaster, the division cooperates fully with all other law enforcement agencies of the state and is an integral part of the Civil Defense action plan.

During recent years, great strides have been made in improving the image of wildlife enforcement agents. Recruitment efforts and training have been intensified to ensure that only well qualified, dedicated individuals are selected and retained. Additional equipment has been purchased so that employees have all of the necessary supplies and equipment to adequately perform their duties.

The training program for enforcement agents has continued to improve. All enforcement agents receive their basic law enforcement training at the Louisiana State Police Academy. For eight weeks they receive instructions in first aid, defensive driving, laws of arrest, search and seizure, and other law enforcement related training.

Upon graduation from the eight week basic school, agents attend a one week Photo-Electric Intoximeter (PEI) Operator's Course. This course certifies the agents to administer a breath test to boat operators who may have consumed alcoholic beverages. Once agents have been certified on the P.E.I. machine, they will attend a wildlife related training session consisting of in excess of 80 hours of classroom instruction and field trips. This means that wildlife enforcement agents will receive 11 weeks of intensive training to better prepare them for the job.

In 1984 all wildlife enforcement agents qualified on the Louisiana P.O.S.T. council revolver course. In addition, the agents received training in night firing and attended a course in C.P.R.

Every effort is being made to fill vacancies so that employment dates coincide with classes at the State Police Training Academy to insure completion of training requirements prior to assigning field responsibilities.

The Operation Game Thief program which was implemented in 1984, received approximately 200 calls alleging wildlife violations. All complaints were investigated, and 22 citations were issued. Twenty-two rewards were paid totaling $5,000. Twenty-five additional cases are pending presentation to the awards committee for a determination of the amount of reward. The majority of the reports allege violations involving big game. Other reported violations include small game and fish. The department has appointed an agent to serve as a special coordinator to screen all calls and act in an advisory capacity to the OGT board.

The Covert Operations Section is responsible for the suppression and control of illegal sales of fish and game within the state. During 1984, the Covert Section was involved in a total of 119 cases; 25 were carried forward from 1983 and 94 were new cases. Arrests were made in 35 cases. It is estimated that covert investigations will result in approximately 53 arrests in 1985. The efforts of this section will assist in preservation of our wildlife resources for future generations.

Enforcement's Saltwater Enforcement Patrol (SWEP), which utilizes two large offshore vessels, became an important part of our program in 1984. This section was designed to monitor the offshore fisheries of Louisiana while patrolling coastal waters as a daily activity. As a result of this patrol, we have realized the nonresident fishing pressure being applied to our offshore waters.

During the calendar year 1984, SWEP stayed on station for 1,520 hours. These patrols included the boarding of 394 fishing vessels and produced 231 citations for violations of Louisiana's laws. Some 188 of these citations were issued to nonresident fishermen residing in the states of Alabama, Florida, Mississippi and Texas. Seizures pursuant to the cases included 66 trawls and 7,000 feet of illegal gill nets.

Information and Education Division

The Information and Education Division, which reports directly to the secretary, keeps the public informed on the full range of department activities.

It seeks to promote public understanding of the importance of Louisiana's renewable wildlife and fisheries resources and to instill, especially in children, the basic concepts of sound conservation practices. Division personnel also conduct training sessions for citizens in the ethics of hunting, responsible use of firearms and boating safety.

The I&E Division maintains constant liaison with newspapers and radio and television stations throughout the state, and in 1984 its writers produced 136 news releases for distribution to those media. In addition, indepth news features accompanied by photographs were serviced to about 120 selected newspaper clients.

One of the division's most popular projects is publication of the Louisiana Conservationist, a bimonthly magazine printed in full color and containing articles of general interest. Circulation has now surpassed 215,000, and the Conservationist is read by an estimated million people. Sent free to Louisiana residents who request it, the magazine's cost has been held down to 33 cents a copy.

I&E also produces and distributes more than 30 wildlife education booklets. Many are designed primarily for young people and are in demand from school and other groups. Such titles as "Wildlife Resources of Louisiana," "Common Birds of Louisiana," "The Wood Duck in Louisiana" and "Harmless and Poisonous Snakes of Louisiana" are often requested by adult organizations and individuals as well. "A Guide to Hunting in Louisiana," "A Guide to Fishing in Louisiana" and "A Guide to Wildlife Management Areas" provide invaluable information to the state's hunters and fishermen. Thousands of these pamphlets are given out each year at fairs, festivals, department-conducted education programs, teacher workshops and in response to mail requests.

The division's library loaned out 1,491 films during the year. Requests for information on wildlife subjects from both laymen and professionals were handled by telephone and by mail.

A new film on the shrimping industry, "Louisiana Shrimp Story," was written, produced and edited by I&E in 1984. Four public service announcements were prepared for use on television. One "spot" on the wildlife income-tax checkoff featured LSU basketball coach Dale Brown. Two produced for the Seafood Promotion and Marketing Board carried messages from Gov. Edwards and jazz musician Pete Fountain. The fourth dealt with hunter safety and also featured the governor.

Besides seeing to the department's needs, division photographers handled many outside photo requests, lending out more than 190 I&E-produced images to the general, corporate and scientific public for use in creating artwork, illustrating brochures and annual reports, and accompanying scientific papers.

Through the services of the educators on its staff, the I&E Division endeavors to provide the public with a comprehensive understanding of the importance of wildlife management programs essential to the many-faceted activities of the department. In all lectures and other educational programs conducted by division personnel, it is stressed that Louisiana's wildlife belongs to the public and that only through public support can wildlife remain a heritage for future generations.

During the year, staff members presented 1,711 education programs to 87,542 individuals, with particular emphasis on youth groups such as school children, college students, and Boy and Girl Scouts. Educators also appeared before adult sportsmen's, civic, church and camping associations.

The 36 radio and television programs conducted by division personnel reached an audience estimated at 5,779,200. There were 189 boating-safety programs presented to 1,209,434 people (including TV viewers), and 105 hunter-safety programs presented to 404,828 people (including TV).

I&E personnel set up 55 wildlife displays at various fairs, festivals and conventions attended by 1,165,405 people. The division's Mobile Display Exhibit Van visited seven fairs and festivals and was viewed by an estimated 36,000 people.

The image of the hunter has suffered greatly in recent years owing largely to the actions of a few irresponsible persons who misuse recreational facilities. The firearms and hunter education program conducted by I&E helps combat this problem by teaching hunter ethics, hunter responsibility and good hunter-landowner relationships. Other topics discussed in detail by some 1,100 volunteer instructors in the hunter-safety course include wildlife management and conservation, game and fish laws, and safe gun handling.

The hunter-safety program, although offered in many schools statewide, will be further expanded in the public schools as the number of certified instructors increases. To meet the needs of the public, plans for additional shooting ranges are being formulated. Now that the Legislature has made hunter-safety instruction compulsory for first-time hunting license buyers, the hunter-safety staff anticipates the certification of 20,000 students in 1985.

During the last year, this staff conducted 33 instructor workshops in which 357 new volunteer instructors were certified. A total of 349 student courses were offered free of charge to 12,852 participants, with 9,651 students passing the course. Besides this full eight-hour course, staff and volunteer instructors held 952 hunter-safety briefings for more than 20,000 participants.

In 1984 the I&E Division resumed publishing its Employee News, a monthly newsletter aimed at facilitating communication and fostering closer cooperation among employees of the department.

Communications Section

The Communications Section provides the only 24-hour, toll-free public assistance "800" telephone lines in the department. This service was increased from one to two lines in 1984. One line, 1-800-442-2511, is used for reporting game violations under the reward-based "catch a thief" project named Operation Game Thief. The other line, 1-800-325-7067, is used for general information, season rules and regulations, license problems, and to report boating accidents and other emergencies. It also provides department personnel with access to the boating registration computer terminal, National Crime Information Center terminal, Lake Pontchartrain Causeway Avoidance Warning System terminal, long range single side band radio communication to the department's large vessels, VHF radio contact with the U.S. Coast Guard, and FM low band radio contact with wildlife agents, aircraft, small boats and outlying camps.

The section also operates as an interface with other agencies providing coordinated information on overdue hunters and fishermen, search and rescue, and other emergency activities on a 24-hour basis.

Four field service technicians provide vital on-the-spot statewide repairs and installation of all mobile communication and electronic equipment used by the department. Major repairs are handled by the central radio shop that consists of two bench-grade radio technicians and one technical supervisor.

The communications section also provides public address systems and legal recordings for all department board meetings and public hearings conducted by the department.

The department's current radio system consists of 36 base stations, 940 mobile units, 422 portable units, 106 boats and five aircraft.

Office of Management and Finance

The Office of Management and Finance is administered by the undersecretary and is instrumental in the implementation of programs and acquisition of equipment by all divisions of the Department of Wildlife and Fisheries. Within this office are the Fiscal Division and three sections: Personnel, Computer, and Building and Services.

Fiscal Division

The Fiscal Division is responsible for all financial requirements of the entire department. This division is composed of the following sections: Fiscal Officer, General Accounting, Payroll, Purchasing, Property Control, Revenue and License Sales, and Motorboat Registration.

Duties of the Fiscal Officer include preparation of the department's annual budget, all financial statements, annual fiscal reports, maintenance of interest funds, federal assistance record-keeping, and monitoring of department expenditures.

The department uses the statewide Financial Accountability Control System (FACS) of accounting for processing vendor payments and recording expenditures.

During 1984, the Motorboat Section instituted use of a new boat decal which is being issued for all registered motorboats. This section reported the following statistics on 1984 activity:

Current Registration	318,118
New Registrations	40,209
Transfers Processed	16,157
Renewals	56,900
Boat Numbers Canceled	38,404

Following is a list of revenue collected by the department during 1984:

Conservation Fund	
Taxes	$ 2,940,180
Royalties	7,991,002
Rental of Land	634,685
Bonuses on Land	82,210
License Sales	7,742,889
Miscellaneous	459,255
Interest Income	61,788
Rockefeller Refuge Fund	
Royalties	$ 9,900,338
Interest Income	595,833
Other Income	1,306,485
Marsh Island Fund	
Royalties	$ 140,832
Interest Income	597,410
Other Income	172,036
Federal Assistance Funds	$ 4,663,135
Interagency Transfers	$ 53,506
LOOP	$ 203,458
Seafood Promotion & Marketing Fund	$ 101,741
Total Revenue	$ 37,646,783

The department's budget for 1984 totaled $35,620,734, with funds allocated to departmental divisions as follows:

Office of Secretary		
2.1%	Executive	$ 753,637
1.3%	Communications	452,182
23.7%	Enforcement	8,440,736
7.6%	Fiscal	2,713,094
3.0%	Computer	1,055,092
4.7%	Information & Education	1,658,002
Office of Wildlife		
.4%	Administrative	$ 127,044
9.9%	Fish	3,557,235
12.1%	Fur & Refuge	4,319,500
13.2%	Game	4,700,632
Office of Coastal & Marine Resources		
1.3%	Administrative	$ 470,615
.7%	Aviation	235,307
19.6%	Seafood	6,980,786
.4%	Ecology	156,872
Total Budget		$ 35,620,734

Personnel Section

All personnel records were entered into the Louisiana Personnel Payroll System (LAPPS), which is the central processing system for all employee and position-related transactions, in August 1984. Two new computer terminals were installed in the Personnel Office which are used for LAPPS input.

In addition to the constant updating of leave records in the United Payroll System (UPS), internal controls are maintained to insure the accuracy of the leave record.

The Personnel Section has been working very closely with representatives of the Department of Civil Service to alleviate some of the problems in the proposed new classification and pay system developed by Cresap, McCormick & Paget.

Assistance with personnel-related matters is provided to a wide range of individuals, including job applicants, active employees, retirees, former employees and surviving spouses.

This section will continue to strive toward a complete comprehensive personnel management program.

Computer Center

The Computer Center services the Department of Wildlife and Fisheries. During 1984, the Computer Center continued its efforts to move the department forward into the computer age by making computerized information available to the Quail Drive, Bon Marche, district and field offices through telecommunications.

Personal computers were placed in offices throughout the state to provide word processing capabilities and perform other needed functions using vendor software packages. Great strides were made in 1984 toward more efficiently serving the people of Louisiana, and this progress will be used as a base for further accomplishments in the coming years.

Building and Services Section

The Building and Services Section serves the important function of building maintenance for Wildlife and Fisheries offices in Baton Rouge and New Orleans and stocks general office supplies for the entire department.

In addition, it also provides services to department personnel including, but not limited to, handling the department interoffice, incoming and outgoing mail; distribution of office supplies statewide; volume copying of books and publications; and printing.

Within the last year, this section has instituted a number of time and money saving programs. These include the installation of new labeling equipment to accommodate the many department bulk mailings, increasing the amount of in-house printing and establishing a prepress darkroom that allows negatives, pasteup and artwork to be done in-house.

Office of Wildlife

The Office of Wildlife, supervised by one of two assistant secretaries reporting directly to the department secretary, oversees the state's wildlife and fisheries resources. The office comprises three divisions: Fish, Game, and Fur and Refuge.

Fish Division

Louisiana's vast fishery resources are vital to the state's economy from the standpoints of both recreation and commerce. The Fish Division is responsible for managing, protecting, conserving and replenishing those resources, and for controlling undesirable aquatic vegetation that hampers fisheries management, navigation, and fisherman access in Louisiana Waterways.

Certain programs of the division that deal with sport fish restoration (research, survey, development and technical assistance) are funded wholly or in part through the Dingell-Johnson federal aid program. Recently, Federal Legislation was enacted that created the Wallop-Breaux Federal Aid Program. These funds are in addition to the on-going Dingell-Johnson funds and will greatly increase the fish restoration programs in the state. Initial plans for the use of these funds will be construction of fisherman access areas (boat ramps, fishing piers, bank access, etc.) and enlargement and improvement of the division hatchery system.

Fisheries Section

The objective of the Fisheries Section is to manage fish populations and habitats for the preservation and improvement of sport and commercial fishing, located primarily in freshwater areas of the state. Activities include:

Lake Management Project In 1984 under this program, 29 lakes were sampled with rotenone to determine fish species composition and pounds of fish per acre. From these data, management plans and recommendations for harvest regulations were formulated. Recommendations for lake drawdowns comprised 8,775 acres, increasing potential fishing efforts from 504,200 to 605,040 for an economic value gain of $2,016,000.

Farm Pond Extension Program Fisheries biologists provide advice and technical assistance to farm pond owners. Fingerling largemouth bass, Florida largemouth bass and bream are furnished to pond owners who meet requirements for stocking. In 1984, advice was given for 1,203 ponds comprising 3,960 acres. These pond stockings resulted in providing 138,600 man-days of fishing for an economic value of $1,386,000.

Fish Hatchery Program Three state-owned fish hatcheries comprising 50 acres, produced 70,264 largemouth bass fingerlings; 236,911 Florida largemouth bass fingerlings; 1,834,448 bream (redear and bluegill) fingerlings; 150 crappie fingerlings; 69,757 striped bass fingerlings; 393,483 hybrid striped fingerlings; 16,000 yellow bass/striped bass hybrid fingerlings and 1,822 flathead catfish fingerlings for stocking in public water bodies and farm ponds. Additional fish were provided through cooperative arrangements with the U.S. Fish and Wildlife Service Federal Fish Hatchery at Natchitoches, Louisiana and stocked in Louisiana water bodies included: bluegill sunfish 2,643,394; redear sunfish 383,960; Florida largemouth bass 414,612; largemouth bass 322,705; blue catfish 101,756; channel catfish 2,046; flathead catfish 2,940; and 957,308 striped bass.

Florida Largemouth Bass Program Nine lakes throughout the state were stocked with 571,931 Florida largemouth bass fingerlings to establish trophy-size Florida largemouth bass fishing so popular with Louisiana bass fishermen. These included Lake Nantachie, False River, Toledo Bend Reservoir, University Lake, Turkey Creek Lake, Bayou Macon I, Bayou Macon II, Bayou Macon III and Indian Creek Lake. Four natural water bodies (rivers and bayous) received stockings of 231,500 fingerlings. These were Tchefuncte River, Bayou Teche, Tangipahoa River and Bayou St. John.

Striped Bass Program The striped bass program in Louisiana is designed for the biological control of shad populations in the state's reservoirs and oxbow lakes while providing a highly desirable sport fish. Excellent populations of striped bass/hybrid striped bass presently occur in many water bodies throughout the state. During 1984, 1,027,065 striped bass were stocked in Toledo Bend Reservoir and 27 other lakes throughout the state were stocked with 830,800 hybrid striped bass. An additional 154,500 striped bass fingerlings were stocked in coastal streams.

Grass Carp (White Amur) Monitoring Program In cooperation with the LSU Cooperative Fisheries Research Unit, the Fisheries Section monitors the invasion and spread of grass carp in Louisiana. Reproduction of grass carp has been occurring for several years in the lower Red River and Atchafalaya River. Larvae were again collected and identified in 1984.

University Cooperative Agreements The Fisheries Section conducted research projects in 1984 in cooperation with three universities. They were Louisiana State University, studying natural reproduction of grass carp and striped bass; University of Southwestern Louisiana, investigating improved techniques in pond culture of crawfish; and Auburn University, researching the identification, diagnosis and treatment of fish diseases and parasites.

Commercial Fish Farming Extension Program Commercial fish farmers, principally crawfish and catfish farmers, benefited during 1984 from assistance and technical advice provided by fisheries section biologists. Approximately 100,000 acres of commercial crawfish ponds were in production in 1984, yielding a crop of approximately 40 million pounds. There were 15,000 acres of crawfish pond production for which fisheries biologists furnished the owners technical advice for proper management. The direct benefit of this assistance is the production of 7,500,000 pounds of crawfish with a wholesale market value of $3,250,000.

Biological work contacts in 1984 contributed directly to the production of 1,500 pounds per acre in 1,200 acres of catfish ponds with a wholesale value of $1,800,000.

Fish Kill Investigations Fisheries biologist were again called upon in 1984 to determine the cause of approximately 100 fish kills statewide. Those kills found to be natural die-offs were investigated as to cause, and when feasible, recommendations were given to correct the problem. Kills caused by industrial and domestic pollution were referred to the Department of Environmental Quality.

Boat Ramp Maintenance The Fish Division inspects and maintains 41 Department of Wildlife and Fisheries boat ramps located throughout the state and used by the general public.

Special Studies Major special study programs conducted in 1984 by Fisheries Section personnel were to study the effectiveness of commercial fishing devices, especially wire traps, for harvesting catfish. A detailed study was also began in 1984 to determine why channel catfish populations in certain water bodies in eastern Louisiana have become stunted.

Dingell-Johnson Fish Restoration Projects in 1984 by title:

1. Fish Management Coordination
2. Southeastern Cooperative Fish and Disease Study
3. Fish Population Investigations
4. Technical Advice to Owners of Farm Ponds and Lakes
5. Lake Bistineau Investigations
6. Aquatic Vegetation Investigation for Sports Fish Management in Louisiana
7. Toledo Bend Reservoir Investigations
8. Movement Study of Estuarine Sportfish
9. Calcasieu Seatrout Project
10. A Survey of Factors Affecting Fish Production in the Larto-Saline Area
11. Survival, Food Habits and Growth of the Florida Largemouth Bass in St. Tammany Parish, Louisiana
12. Striped Bass Production
13. Flathead Catfish Production

Aquatic Plant Research and Control Section

This section conducts research on troublesome aquatic plants in Louisiana waters, provides technical information on control methods, and supervises and conducts a statewide program of spraying water hyacinths on public waters in Louisiana.

Water Hyacinth Control Program During the fiscal years 1983/84, the aquatic weed control program provided substantial benefits to millions of Louisianians. Section crews, utilizing boats, airboats, mudboats and roadside spray units, effectively applied herbicide to 43,122 acres of Louisiana's freshwater wetlands infested with water hyacinths. Another 9,827 acres were treated by helicopter application for a total of 52,949 acres.

Special Control Projects During the year, limited applications of specialized herbicides were used to relieve unusual and severe infestations of aquatic weeds in Black Lake, Baton Rouge City Park Lake, False River and other areas. These applications were temporary measures and served to familiarize local residents with safe and effective use of aquatic herbicides.

Lake Management Program An important part of the stewardship of Louisiana's wildlife and fisheries resources is the skilled and professional management of the state's public lakes. Aquatic vegetation investigations were made by section personnel as to plant species composition and density on 23 lakes. The primary objective of this work was to obtain accurate records of aquatic weed infestations in these lakes which is necessary for the proper formulation of workable management plans.

Noxious Plant Monitoring Program An ongoing part of the section's responsibilities is the identification and monitoring of noxious non-native aquatic plant populations invading Louisiana's extensive wetlands. In cooperation with personnel of the U. S. Army Corps of Engineers, a close watch is kept on the density, environmental impact and rate of spread of these introductions. A notable example is hydrilla, a submersed aquatic plant that was discovered in Louisiana in 1973 and is now spreading into many areas of the state with the potential of becoming a more serious pest than the water hyacinth. Another more recent introduction, but also potentially quite troublesome species is salvinia. This relative new-comer to the state has begun making its appearance in several areas of South Louisiana and is being monitored very closely.

Technical Assistance Program Section biologists provide advice and technical assistance to private pond owners and municipalities concerning aquatic vegetation management problems. In addition to offering professional recommendations for the establishment of proper management programs through this popular extension program, biologists also provide aquatic plant species identification assistance for the inquiring public on request.

Research Programs Ongoing research projects of the Aquatic Plant Research and Control Section include:

- Evaluation of new herbicides to determine their availability and effectiveness for use in aquatic weed control.
- Development of aquatic vegetation manipulation techniques for use in waterfowl habitat enhancement.
- Continued investigations into the affects of environmental conditions and water fluctuations on hydrilla, as well as evaluations of chemical, biological and mechanical methods of its control.
- Data collection for a study of chufa tuber and forage production within mature water elm-swamp privet zones, has been completed and results are presently being written up. This research project seeks to determine the loss of waterfowl food caused by the encroachment of water elm and swamp privet on the bed of Catahoula Lake.

Other Projects Section personnel are presently undertaking a project to map and contour all major lakes built in the state since 1972, as well as updating earlier maps on several additional lakes as needed. These maps should provide valuable information to sportsmen and lake managers alike.

Plans are also being developed for the publishing of a full-color pictorial guide to the aquatic plant species of Louisiana. Field personnel are presently collecting photographs throughout the state for inclusion in this booklet. Both public awareness and interest in our aquatic ecosystems should be heightened by this informative publication.

Game Division

Land Acquisition

Land acquisition remains one of the Department's most important activities. During 1984 there were 3 purchases made totaling 16,065 acres at a cost of $13,176,284.00 Since 1960 the Department has purchased 320,000 acres of wildlife habitat for 60 million conservation dollars. All of this acreage has been dedicated to public recreational uses.

Forestry Section

Forest management plan work continued during the year on the Three River's WMA. Preliminary forest inventory work was begun on the Sherburne WMA and on the recently purchased Big Lake WMA. The Forestry Section was also very actively involved with forest management on the Kisatchie National Forest, including a review with comments on its recent proposed fifty-year forest management plan.

Thirty timber management prescriptions on the Caney, Catahoula, Evangeline, and Winn Ranger Districts were studied with written wildlife related recommendations submitted to respective districts. Many of these recommendations were accepted and incorporated in the Kisatchie National Forest's final management plans.

Other activity consisted of participating as a member of the Forest Resources Technical Committee. This consisted of study on a number of public lands issues involving forestry.

Research Section

The Research Section gathers data on game birds and animals, largely for use in formulating hunting regulations. Separate programs monitor the population of doves, deer, waterfowl, turkeys and upland game birds. Hunters are surveyed by mail as a means of estimating the annual harvest of various game animals and birds.

Doves Setting the dove hunting regulations dominated the attention of the Research Section in 1984. After three consecutive years of all-day dove shooting, 1983 regulations were changed to return to afternoon-only hunting after the opening week-end of each season segment. In 1984, the Commission elected to return to the traditional regulation allowing afternoon-only hunting following the results of an opinion survey indicating public preference for this regulation.

For the first time, the Commission also selected an option which allowed a 15-dove bag limit with a 60-day season in 1984 and will await public response to this larger

bag limit and shorter season before setting next year's season. Through all these hunting regulations changes, Louisiana's dove harvest and dove nesting population, as measured by the Spring count of cooing males, has remained relatively stable. Selecting a set of hunting regulations which will satisfy most of Louisiana's dove hunters remains an elusive goal.

Deer Biological data essential to the state's deer programs were compiled at Wildlife Management Areas during managed hunts open to the public. At 21 major deer areas, biologists at daily check stations studied 1826 deer kills by 38,741 hunters.

Veterinary health surveys were conducted in 11 herd areas—one each in East Carroll, Jackson, Morehouse, and West Feliciana Parishes, plus two in East Feliciana and three in Pointe Coupee. In depth studies focused on deer herds of newly acquired land of both Big Lake Wildlife Management Area and Tensas National Wildlife Refuge. These surveys were made in conjunction with the Southeastern Co-operative Wildlife Disease Study.

Other deer work in 1984 included deer range and population surveys with management guidance provided on 410 clubland areas participating in the state's Intensive Deer Management Unit program. This is a 217 percent increase in participation since its beginning in 1981. In addition to soaring recreational values, many poor quality deer herds are being improved through sound scientific management on more than 800,000 areas currently enrolled in the program.

Turkeys As in the past years, the Research Section has placed significant emphasis on the wild turkey program. This program consists primarily of a research phase and a restoration phase, with the restoration phase being aimed at repopulating all areas of suitable turkey habitat in the state. During this past year, the trapping success was severely hampered by the bumper crop of acorns and other types of preferred mast and, consequently, only 55 wild turkeys were captured.

In order to better understand the factors affecting turkey restoration, the evaluation of past turkey releases was continued and six restoration areas were surveyed and evaluated.

Throughout the year, 14 areas of turkey habitat were inspected and inventoried to determine the status of turkey populations on those lands. Data obtained from these studies was used to determine whether or not restocking should be considered and if seasons, bag limits, or present management direction is appropriately adjusted to the resource.

Telemetry studies were continued in order to gather additional information on habitat use, reproduction, and the effects of flooding on wild turkeys in the riverfront hardwood regions along the Mississippi River. This is a cooperative study being done with the Louisiana Cooperative Wildlife Research Unit at Louisiana State University.

Waterfowl Louisiana has approximately 4 million acres of coastal marsh which is attractive to numerous waterfowl populations. It is estimated that approximately 5 million waterfowl migrate through the Central and Mississippi Flyway and winter in Louisiana. The mid-winter waterfowl survey indicates that 3.8 million waterfowl were observed in the coastal marsh including limited inland areas of the Mississippi Delta.

Preliminary waterfowl harvest data indicates most hunters bagged fewer ducks than last year. With over 20 inches of rain that fell in October, the marshes of Southwest, Louisiana were flooded throughout the month of November. This in itself had more to do with hunting success than any other factor.

In 1983, 125,000 duck hunters bagged slightly over 2 million ducks. Species composition was blue-winged teal (18%), mallards (17%), gadwall (16%), green-winged teal (13%), wood duck (11%) with pintail, wigeon, shoveler, scaup and mottled ducks forming the remainder.

Development Section

Wildlife Management Areas The Department of Wildlife and Fisheries operates 38 wildlife management areas (WMA's) comprising of 1,080,915 acres of which the Department owns in excess of 556,700 acres. In 1984 more than one million trips were made to these areas by visitors seeking the enjoyment of an outdoor encounter in the form of hunting, fishing, camping, hiking, boating, bird watching, picnicking, and other forms of related outdoor activity.

In August 1984 the Department purchased the 5,621 acre Anderson Farm in Ouachita Parish. This purchase played a significant part in increasing the size of the adjacent state owned Ouachita Wildlife Management Area. Part of this addition was cultivated farm land. A plan has been developed to reforest that land with hardwoods indigenous to the soil type and beneficial to wildlife. This plan will be implemented in the late winter of 1984-85 by planting seedlings and acorns.

As lands throughout the state become leased for hunting clubs the importance of wildlife management areas is rapidly increasing in furnishing a place for the public to have a place to go and enjoy the outdoors. Species hunted on most of the areas are deer, squirrel, rabbit, turkey, waterfowl, dove, woodcock, and snipe. For those areas that have fishing, sport fish species are bass, bream, and crappie. Crawfishing, as a sport, is increasing on those areas that have a source of this resource.

District Activities For wildlife management and administrative purposes, the state is divided into eight districts each with a district office, district supervisor and district biologists and technicians who are assigned to wildlife management areas or work throughout the district.

Typical district activities include conducting managed hunts on wildlife management areas, checking hunter bags, making control burns, planting food plots, providing technical assistance to landowners, trapping and banding waterfowl and turkeys, conducting deer range surveys, conducting fur animal censuses, meeting with government and sportsmen's groups, conducting the Intensive Deer Management Unit Program, formulating hunting season recommendations, preparing annual and long range management plans, and budgeting.

District work is coordinated on the State level to provide data for better management of the states wildlife species.

Heavy Equipment Section

Road repairs and maintenance work was performed on 17 wildlife management areas during the year. Winter rains and spring backwater had caused considerable damage to some roads. On those, complete road beds had to be rebuilt with gravel or some other materials applied to the surface. At the Sherburne Wildlife Management Area the section completed the dirt work for a backstop for a rifle and pistol range. The section also cleaned debris off some public boat launching ramps.

Maintenance Section

This section did building maintenance, renovation and construction at department owned installations throughout the state. Tasks specifically completed were an addition to the Minden office for the Enforcement Division, more work at the Baton Rouge Bon Marche' office, deer weighing and permit stations, remodeling of overnight facility at Minden, metal storage building at Attakapas Wildlife Management Area, an addition to the Alexandria office was started, renovation of the office at Monroe was completed, and numerous other small jobs.

Animal Control Section

During 1984 the Animal Control Section received 284 request for aid from landowners. Beaver damage accounted for 67% of the request and coyote complaints for 30%. The remaining 3% was for raccoon, opossum, fox, and skunk. Nuisance animals removed at landowner request included 440 beavers, 96 coyote, 7 domestic and ferral dogs, 4 opossum, 5 raccoons, 14 nutria and 1 bobcat.

Permits were issued to 57 landowners by the department Secretary to enable the landowners to control nuisance animals on their property.

Upland Game Section

Acres For Wildlife The Louisiana Acres for Wildlife program continues to gain in popularity as evidenced by a 13 percent increase in participation during 1984 over the previous year. A total of 760 participants were enrolled in the statewide program during 1984, compared with 657 in 1983. Concurrently, the amount of land enrolled in Acres for Wildlife also increased with 562,207 acres enrolled in 1984, a 13% increase over the 498,917 acres enrolled in 1983. Program biologists inspected land, prepared management plans, provided planting materials for participants, and made presentations to youth, civic, and sporting groups.

Pheasants A second release consisting of 49 pheasants was made on the area below Sulphur. Twenty-five of these birds were fitted with telemetry units. Data collected during the monitoring period have been assimilated and analyses were initiated. Spring cock pheasant crowing counts were conducted only on the Lake Arthur release area. Counts for this area were about the same as those for 1983. Cock pheasant crowing counts were discontinued on the Florence release area due to a generally inadequate network of all-weather roads in the vicinity of the release and the population's apparent association with an isolated block of marsh and farmland.

Quail Food plots totaling in excess of 500 acres were planted in upland game areas. Included as plots were in excess of 300 miles of strip plantings. Additional acreage was bushhogged, disced, and control burned by department personnel. Two surveys were conducted this past year: the wing survey and the fall whistling census. Hunters participating in the annual wing survey supplied 571 wings to be aged. Sex and age ratio were determined. The expanded, statewide fall whistling counts were conducted in late October and early November. Inferences about population conditions were developed based on the combined results of these two survey techniques and general observations made by department personnel during the breeding season. Technical assistance was also provided by section and district personnel to landowners and lessees interested in managing properties for quail.

Oaks for Wildlife Acorns and pecans collected by department personnel, private individuals, and conservation groups were delivered to the Office of Forestry nursery in Columbia thus providing some 36,000 seedlings. Hardwood species available were cow oak, live oak, sawtooth oak, sweet pecan, water oak, and white oak. Approximately 22,500 seedlings were distributed to 250 people with the remaining 13,500 seedlings being utilized by the department on wildlife management areas.

Fur and Refuge Division

The activities of the Fur and Refuge Division can be divided into three major categories: managing land which the Department owns or leases; research into new and improved management practices for the State's fur, alligator and other wildlife resources; direct land management and supervision of the State's fur and alligator resources.

Land Management

The Fur and Refuge Division is responsible for the management, improvement, and protection of five refuges and four wildlife management areas. With the exception of Coulee Wildlife Refuge, all of the areas are in the coastal marsh zone of South Louisiana. Refuges comprise 177,000 acres and wildlife management areas comprise 251,000 acres.

Management practices employed on the refuges and wildlife management areas are primarily directed toward improving wetlands for resident and migratory waterfowl. The multiple-use management concept is used wherever feasible, so that many other aquatic based animals, including furbearers, fish, and resident game and nongame birds, also benefit from the management.

Public demand for recreational use on refuges and wildlife management areas continues to increase. Sport fishing, crabbing, and nature study are very popular activities on wildlife management areas.

An extensive law enforcement program is carried out on all Fur and Refuge Division managed property. Mineral activities on all the areas are closely monitored.

Rockefeller Refuge The state-owned Rockefeller Refuge, located in Cameron and Vermilion parishes, comprises some 85,000 acres of prime coastal marshland. Impoundments varying in size from 480 to 5,680 acres have been constructed on the refuge to house the over 400,000 waterfowl that spend the winter on the area each year. Year-round residents including nutria, muskrat, raccoon, otter, mink, deer, and alligator are in good numbers on the refuge.

During 1984, major repairs were accomplished on the headquarters complex. A new workshop and new West End dormitory were constructed and residents 1 and 2 were completely renovated. In addition, two major repair contracts have been completed for water control structures on the refuge that will significantly add to the enhancement of approximately 30,000 acres of prime waterfowl habitat.

Marsh Island Refuge In 1982, 35 wakefield weirs on Marsh Island Refuge were examined and determined to need repairs. Renovation work on these weirs is now in progress. These water control structures enhance the production of valuable waterfowl food plants such as widgeon grass and najas by stabilizing water levels and in some cases reducing turbidity. With the increase in aquatic production, Marsh Island has served to winter large concentrations of waterfowl throughout the winter periods. Also, stabilization of water levels during the spring and summer months has added greatly to the production of local nesting birds, primarily the mottled duck, a very important bird in the hunters bag along the coast of Louisiana. Aquatic animals such as alligator depend largely on stable water levels during the summer for nesting and later as brooding habitat for their offspring.

State Wildlife Refuge State Wildlife Refuge located on the western shore of Vermilion Bay was donated to the

State in 1911. This 13,000 acre tract, one of the first wildlife refuges of its kind in the United States, serves primarily as a wintering area for some of the largest concentrations of blue/snow geese in Southwest Louisiana. Several low level weirs have been installed in the natural drainage patterns in order to enhance production of food organisms necessary for wintering waterfowl, furbearers, and estuarine-dependent species which periodically inhabit the area. A carefully controlled burning program has been underway on the refuge for many years. During the fall and winter periods the annual rough is burned off making root systems and the tender succulent regrowth more palatable to the tremendous concentrations of blue/snow geese that frequent the refuge during their winter stay.

Atchafalaya Delta Wildlife Management Area The Atchafalaya Delta Wildlife Management Area, one of the largest and most recent land acquisitions of the Department, has the potential of being one of the most productive and dynamic wildlife management areas on the North American Continent. Due to sediment deposited by the Atchafalaya River, the land area of Atchafalaya Delta is accreting by some 1,000 acres annually. This new delta formation serves as host to hundreds of thousands of waterfowl annually. Since acquisition of Atchafalaya Delta by the Department, waterfowl hunters have had the opportunity to use this area. Camping and mooring sites constructed by Department personnel have provided hunters a safe place to overnight.

Pass a Loutre Wildlife Management Area The Pass a Loutre Wildlife Management Area is composed of 66,000 acres of marshland located at the mouth of the Mississippi River in Plaquemines Parish. The area is extremely attractive for waterfowl due to its location at the terminus of the flyway system and production of choice waterfowl food plants. This entire Delta system is experiencing significant marsh loss. Approximately fifty percent of the emergent vegetation of the Delta system has been lost during the period from 1956-1978. Due to the extreme marsh loss rates that are occurring in the Mississippi River system, several innovation marsh creation projects have been underway on the management area.

One such project utilizes man-made canals to direct sediments into subsided bay systems. The project shows potential for creating marsh within these open water areas. The project was submitted by the Department in 1983 to the Governor's Coastal Erosion Task Force which confirmed the project and allocated approximately one-half million dollars for construction and scientific study. The project is presently in the initial project planning phase investigating potential sites for sediment diversion. This phase will be completed by April, 1985 and the final report is expected to be completed during the latter portion of 1986.

A second study which is presently underway has also shown great promise in the area of marsh creation. This study utilizes synthetic materials to capture sediments which may ultimately be transported into the Gulf and lost to the natural Delta building processes. A pilot project was completed in 1983 and an expanded study was initiated in February, 1984. Preliminary information concerning the 1984 study is promising.

Several projects utilizing petroleum access canals and spoil levees are also being monitored to determine methods where these artificial systems can be utilized to enhance sedimentation processes. During 1984 a sediment diversion canal was constructed on the management area which is presently being monitored for delta growth. As with the other canals being studied, this recent canal will serve a dual purpose in allowing oil and gas companies access to their location while simultaneously enhancing delta growth.

Salvador Wildlife Management Area The Salvador Wildlife Management Area is located along the northwestern shore of Lake Salvador in St. Charles Parish. The area is comprised of approximately 30,000 acres of fresh and intermediate marsh which produces ideal habitat for waterfowl. A sizeable deer herd is present within this wetland system: natural levees; wax myrtle thickets; and access canal levees create a diversification of habitat which has provided good conditions for the present deer herd. Department biologists have been closely monitoring the increasing deer population on the area.

The management system is also located within a major catfish producing area, the Lake Salvador—Lake Des Allemands complex. An annual catfish tagging study provides valuable information concerning this fisheries movement patterns within this complex. In addition to the catfish tagging study, a wire-trap project was conducted during 1984 to investigate the efficiency and catch composition relative to the standard slat traps which are presently utilized in the commercial fishing industry. Data from this study is presently being compiled for publication and being utilized for management decisions concerning the use of wire-traps.

A study was conducted in 1984 in cooperation with Louisiana State University to ascertain factors which are responsible for reduction of wax myrtle stands within this wetland complex. The wax myrtle is an important plant species providing cover habitat for the white-tailed deer. Preliminary findings have indicated that subsidence is the major factor in reduction of wax myrtle stands. A final report concerning this study will be completed in the early portion of 1985.

During 1984 a new management unit was designated on the area. The unit is bounded on the East by Bayou Verret, on the South by Lake Cataouatche, on the North by Highway 90 Borrow Canal, and a natural cypress-tupelo ridge system is the Western border. Due to an alarming rate of marsh loss within this system, the Department has constructed one weir along Bayou Verret and anticipates construction of a weir system along the Highway Borrow Canal in conjunction with repairing several levee breaks along this system. Construction of the above structure and levee repairs will place this unit under water management and reduce present deleterious marsh loss rate.

Pointe-au-Chien Wildlife Management Area The Pointe-au-Chien Wildlife Management Area is comprised of approximately 30,000 acres of marshland. Marsh types vary from nearly fresh to brackish. The area provides habitat for waterfowl but is gradually changing to a more saline environment which is more conducive to marine organisms. In addition to increased salinities, the area has experienced extreme marsh loss rates in recent years. Factors which have influenced this deterioration trend include; saltwater intrusion, canalization, reduction in fresh water and sediment influx, subsidence, extreme tidal fluctuation, erosion, and a rise in sea level. The following projects have been proposed to offset this significant marsh deterioration process:

Montegut Project The Montegut Project will place approximately 4,000 acres of wetland under management. The project is located southeasterly of Montegut between two natural ridge systems formed by Bayou Terrebonne and Bayou St. Charles. Approximately 4.0 miles of levees, one 100 ft. and two 50-ft. fixed crest weirs will place this wetland system under management and ultimately enhance wildlife and fishery resources of the area. During 1983 the project was proposed to the Governor's Coastal Erosion Task Force and is presently in the initial planning stages.

St. Jean Charles Project The St. Jean Charles Project is located between the St. Jean Charles and Bayou Pointe-au-Chien ridge system. A parish road connects the two ridges and forms the southern boundary of the project area. The area encompasses approximately 4,500 acres. A proposal has been submitted to place this area under water management by installing three fixed crest weir structures. The Department presently has a mitigation agreement with private industry for installation of one weir structure and is pursuing a mutual agreement with adjacent land owners, parish representatives, local fishermen, federal and state agencies prior to construction activities. A temporary setback has been experienced on this project due to the presence of an existing oyster lease in the vicinity of a proposed weir structure. Negotiations are presently being conducted to provide an equitable solution.

Grand Bayou Project The Grand Bayou Project encompasses approximately 4,500 acres of wetlands located immediately west of Grand Bayou and Cutoff Canal. Similar to the Montegut and St. Jean Charles Projects, the area has experienced significant wetland loss. The project proposes approximately seven miles of levee system with three fixed crest weir structures. The U. S. Fish and Wildlife Service in coordination with our Department has submitted the project to the Corps of Engineers as potential mitigation for the LaRose to Golden Meadow Hurricane Protection Levee. During 1984, two of the three weir structures were completed by the Department and approximately two miles of levee and numerous plugs within the system. A final report is in the process of completion by the Corps of Engineers which hopefully will clear the path for construction of the remainder of the project. The Department has proposed an innovative weir design for the three weirs incorporated in the Grand Bayou Project. The new design will allow for increased stabilization of the weirs while allowing increased fishery movements across the structures.

Bully Camp The Bully Camp is located west of the Bully Camp Oil and Gas Field and is bordered entirely by petroleum access canals. The project will encompass approximately 1,000 acres and requires approximately one mile of levee system, two weir structures, one major dam and repair of five minor levee breaks. In conjunction with private industry, and federal and state regulatory agencies, several mitigation projects have been agreed to within the project site. During 1984, the levee and repairs to all levee breaks were completed. It is anticipated that the remainder of the project will be completed during 1985 or early 1986.

New Iberia Office

During 1984, Fur and Refuge Division expanded the New Iberia office by approximately 1,600 square feet. This expansion included enlarging the existing reception area, four additional offices, a conference room, file room and bathroom. The Division also purchased two acres of property and a 3,200 square foot metal building which is located adjacent to our existing office. This purchase will provide for much needed storage space for equipment, supplies, and a laboratory.

Research

The Fur and Refuge Division's research program is managed by three biologists stationed in North Louisiana, eight biologists in coastal Louisiana, two administrators, and a number of non-technical personnel. Areas of research responsibility included statewide alligator research and harvest, statewide fur research and management, research directed toward marsh enhancement, marsh ecological monitoring, alligator farm research, statewide alligator farm extension service, Canada geese and brown pelican conservation programs, estuarine fisheries research, pond culture studies and, very importantly, research directed towards conservation of Division managed property. The dissemination of information was an important function of the Fur and Refuge Division during the past year. Scientific information was distributed in the form of lectures to visiting school/university groups, technical writings, symposia presentations, in-service training programs, landowner/farmer extension, department movies, magazine articles, and through the news media.

In agreement with the Division's overall research program, fisheries studies were continued. These included aquaculture of various species and studies of life histories and effects of water control systems on various finfish.

Pond studies of the giant Malaysian prawn in polyculture with golden shiners were most encouraging with prawn yields from post larvae ranging from 470-660 lb/acre and shiner yields ranging from 120 to 672 lb/acre. Prawn cultured singularly yielded from 437 to 672 lb/acre.

The major portion of the striped bass reared in Louisiana's anadromous program were again reared at the Fur and Refuge Division's Rockefeller Refuge. This cooperative project with the Fish Division resulted in 102,174 fingerling fish being stocked in the Mermentau River and 52,260 in the Calcasieu River during 1984. Since the initiation of the project in 1972, 1,117,987 have been placed in the Calcasieu and 660,282 in the Mermentau River systems. Sport fishermen of Southwest Louisiana have reported catching stripers up to 21 pounds in weight as a result of this project.

Growth and movement studies of the commercially important channel and blue catfish were continued during 1984. Fish were captured in slat traps, tagged and released at the capture site in the lower Superior Canal complex on Rockefeller Refuge and in Bay Cabanage and headquarters area of Salvador Wildlife Management Area. The Rockefeller study consisted of 3,641 catfish being tagged and 2,618 channel catfish tagged at Salvador. Since 1973, 11,320 catfish have been tagged at Rockefeller. Approximately 4% have been recaptured by fishermen. Catfish tagged at Salvador since 1979 totaled 4,132 and 2% have been recaptured. Movement has been considerable.

A study was conducted at the Salvador Wildlife Management Area utilizing wire traps of the Florida design. These traps which contained a vertically slotted second throat were compared to slat traps. The wire cages accounted for 77% by number and 74% by weight of the 1,875 pounds of catfish weighed in the study. A large percent (77%) of the catfish captured in the wire cages were less than 11 inches total length. Slat traps caught 65% less small fish than wire cages.

Standing crop estimates conducted from 1979 to 1983 at the Sabine National Refuge were analyzed and published at the Louisiana Chapter of the American Fisheries Society Conference. This was in support of LSU's fisheries investigations of the life histories of marine organism using the refuge. The estimates were extremely variable.

Alligator research involved pen studies, egg incubation and short-term rearing of young in controlled environmental chambers, and very specialized laboratory studies of blood, hormones, and tissue samples. Proper diets were found to greatly influence improved reproduction success and the general good health of pen-reared alligators. Proper stocking densities, male to female ratios, and pen design features were found to greatly enhance reproductive success. Reproductive success for pen alligators, using culture techniques mentioned above, in 1984 exceeded that for the wild population. This is a first time accomplishment for capture crocodilians. Blood samples taken from a number of pen alligators revealed that stress hormone levels were comparable to those of wild breeding alligators.

Alligator eggs were artificially incubated at a high and a low temperature and shifted between temperatures at weekly intervals to discover at exactly what stage temperature dependent sex determination occurs. Embryos are currently being processed in a Belfast, Northern Ireland laboratory to finalize results of the study. Preliminary results indicate that male alligators are produced at higher temperatures and females at the lower end of the incubation range. Also, studies indicate growth of alligators is controlled by egg incubation temperatures. Studies clearly demonstrate alligator eggs incubated at a certain temperature (87-89° F) grow faster, produce fewer runts and have a better survival rate as compared to eggs incubated at higher or lower temperature ranges.

A statewide sample of alligator femurs were collected and processed into slides to be examined for growth annuli. Bone aging will enable inventory of harvest by sex and age class and thereby provide better understanding and allow refinement of the alligator harvest program.

Brown pelicans fared well in the two Louisiana colonies in 1984 with a total of 1,117 fledglings produced. Environmental parameters continue to limit their success, now as historically in Louisiana.

1984 marked the first year of transplanting 50 Louisiana raised birds from Queen Bess Island to a new site, hopefully establishing a new colony on Last Island. Last Island is an island with tremendous potential. A continued effort to establish this colony and diversify the Brown pelican range in Louisiana is essential.

Production from the Rockefeller Refuge Canada goose flock, approximately 400 young, were allowed to stay with the flock in 1984 to help build up the breeding nucleus. Hopefully, additional birds can now be added to the five satellite geese flocks (plus initiation of additional flocks) established around the state.

A mottled duck field study in cooperation with Auburn University was completed after 3 years of investigation. Primary objectives were to investigate activity patterns, social organization, movements, and characteristics of habitat and population densities of mottled duck by habitat type. Secondary objectives were to investigate: feeding ecology, nesting ecology, morphology, and nutrition and energetics.

Major emphasis of the Fur and Refuge Division's fur research program continues to be a collection of data for a better understanding of factors that affect nutria population variations in coastal Louisiana. Research on other fur animals included otter telemetry and pesticides residue levels, muskrat reproduction and nest chamber elevations, mink food habits and bobcat telemetry.

Nutria reproductive biology research continued at Lacassine National Wildlife Refuge. Bimonthly collections during 1984 were continued to provide four years of reproductive data. This reproductive information provides a comparison for nutria reproduction data from other areas. Average litter size (4.0) remained consistent for 1984. However, extremely cold weather in December 1983 and January 1984 did affect the percent of females pregnant (49%) during February 1984. April and July collections showed an increase in percent of females pregnant (90%) which corresponded with habitat recovery during the spring and summer of 1984.

We continued to monitor the genetic impact of introducing nutria into an area on the north shore of Vermilion Bay. Results indicate that a permanent genetic impact was affected with an increase in heterozygosity and a change in gene frequencies toward those values found in the nutria that were released. A population flush did occur in the study area within 15-21 months of initial release. Although it is not certain that the population increase was a direct result of the introduction of alien nutria, we feel that the introduction played a major role in the occurrence.

Coding and data analysis continued for the otter telemetry study. A paper concerning otter pesticide levels with emphasis on PCB levels and their affect on reproduction was prepared in conjunction with personnel at Patuxent Wildlife Research Center. Fur and Refuge Division personnel attended an otter workshop in Columbia, Missouri and provided information on our otter research program and otter trapping and handling techniques.

Coding and data analysis continued for the bobcat telemetry study.

Contractual agreements for research on mink, muskrat, and fox-coyote interactions were initiated during 1984. A mink food habit and body condition assessment study is being conducted in conjunction with the School of Forestry and Wildlife Management at Louisiana State University.

A study concerning muskrat reproduction, elevation of nest chambers, and the effects of tidal flooding on reproduction was initiated with cooperation from the School of Forestry and Wildlife Management at LSU.

A fox and coyote telemetry study designed to determine activity patterns, habitat-use patterns and to analyze interspecific competition between red fox, gray fox, and coyotes is being conducted in conjunction with Southeastern Louisiana University.

The annual bobcat scent station study used to index bobcat, fox, coyote, raccoon, and opossum populations was canceled for the first time in seven years due to severely inclement weather that would have rendered the data virtually unusable.

The annual fur buyer-dealer reports concerning fur harvest distribution by parish and region for each species continued for the seventh consecutive year. This information was combined with coastal land company harvest records to provide the data for a paper entitled "Fur Harvest Distribution in Coastal Louisiana" which was presented at the Fourth Coastal Marsh and Estuary Management Symposium in Baton Rouge. This was the first attempt to provide accurate fur harvest data on a regional (Chenier Plain, Atchafalaya Basin, Inactive Delta and Southeast Swamp) parishes and vegetative type (fresh, intermediate, and brackish marsh) basis.

The annual *Bidens laevis* survey was conducted in October 1984 and results indicated no major changes in the distribution of the plant in fresh marsh areas of coastal Louisiana.

Species composition and relative abundance of marsh vegetation was determined for study areas on State Wildlife Refuge and Lacassine National Wildlife Refuge. This vegetative data will be used to assess the effect that vegetative changes may have on nutria reproduction and population densities.

Through funding by the U.S. Army Corps of Engineers, an aerial vegetative inventory was conducted in Iberia, St. Mary, and Terrebonne parishes in conjunction with Avoca Island Levee Extension Project. An aerial vegetation inventory was also conducted on Atchafalaya Delta Wildlife Management Area.

The annual trapping season for 1983-84 yielded the lowest net dollar value (4.3 million) since the 1967-68 season. The strength of the U. S. dollar as compared to various foreign currencies has continued to result in low fur and a subsequent inadequate harvest of fur animals in coastal Louisiana. Land managers in southeastern Louisiana reported that only 50% of the trappers participated in the 1983-84 trapping season. Because of the low fur prices, inadequate trapping effort, high water conditions, and localized high population densities of nutria and muskrat, the trapping season was extended March 15, 1984 in the entire South Zone of the state. We feel that the extension did help control some overpopulations of muskrat and nutria in the Cameron and Vermilion Bay areas.

During the past year, the technical staff conducted several 3-day alligator symposia in conjunction with the U. S. Fish and Wildlife Service, International Affairs Office. These symposia, conducted at Rockefeller Refuge were attended by technical representatives from South America, Central America, and India. The information presented at these meetings was designed to assist these foreign nations in establishing a research/management program in their respective countries.

The Fur and Refuge Division participated in the 38th Annual meeting of the Southeastern Association of Fish and Wildlife Agencies in New Orleans, Louisiana this past year. Three technical papers were presented at this meeting dealing with the Division's brown pelican and alligator research and management programs.

The Crocodile Specialist Group of the I.U.C.N. met in Caracas, Venezuela. Personnel of the Fur and Refuge Division's research staff are members of this international group and presented three technical papers at the management conference. Papers dealt with the ongoing alligator research and management programs statewide. Also, the Crocodile Specialist Group makes recommendations to the Secretary of CITES for the reclassification of all crocodiles/alligators that will be allowed to enter international trade.

Personnel of the Fisheries Research Staff presented research findings at the Louisiana Chapter of the American Fisheries Society held in Lafayette, Louisiana, Prawn Culture Workshop at Louisiana State University in Baton Rouge Louisiana, and the World Mariculture Society Conference in Vancouver, British Columbia.

Personnel of the Fur Section continue to be very much involved in activities related to the future of fur marketing and management. Greg Linscombe served as chairman of the Fur Resources Committee of the IAFWA for a second year. At the request of the new chairman, Lon Strong, Director of Mississippi Department of Wildlife Conservation and the support of the Department, Linscombe became the liaison between the United States fur biologists and the Fur Institute of Canada. This task required three trips to Canada during 1984. The Fur Section has taken a leadership role in a nine state, three province evaluation of the new "soft catch" trap. All trapped furbearer legs will be sent to division personnel for processing and the LSU School of Veterinary Medicine for analysis of damage. Efficiency of the trap will also be analyzed. All state wildlife agencies will be interested in this data. The future of trapping in several states including New Jersey, will be determined by the results of this study.

The Fur and Refuge Division provides funding to the Louisiana Cooperative Research Unit at Louisiana State University and assistantships for numerous other university research grants. This funding has provided additional short-term studies by outside technical personnel. These are probably some of most productive research projects in the Department. In addition, the Rockefeller Fund provides $300,000 annually to the Board of Regents to fund fish and wildlife research projects at the state universities. Additionally, 52 scholarships in the amount of $1,000 each were available in 1984 for university students through the Rockefeller Fund. During 1984, 13 technical papers were published and approximately 30 technical projects were begun or continued.

Resource Management

The Fur and Refuge Division has the responsibility of managing the fur and alligator resources of the state. The division's overall goal is to maintain or improve the resource base while allowing optimum utilization.

The 1984 alligator season was very successful in that 16,924 alligators were harvested for a 95.3% success rate. Prices received for hides averaged $22.50 per foot.

Interest in alligator farming increased dramatically statewide with four farmers going into operation in 1984, giving a total of 12 presently in business. A total of 5,500 young alligators were hatched at Rockefeller Refuge and distributed to nine farms for breeding stock. Advice and technical expertise were provided to all farms as requested.

Harvest data for the 1983-84 trapping season showed over 1.3 million pelts taken for a total value of roughly $4.3 million. These figures are down again from the previous season, the drop due to lower pelt prices because of world economic conditions and the strength of the U.S. dollar.

Office of Coastal and Marine Resources

The Office of Coastal and Marine Resources is one of three offices within the Department of Wildlife and Fisheries. This office, headed by one of two assistant secretaries who reports directly to the secretary, is charged with managing and regulating Louisiana's marine fisheries resources and waterbottoms within the guidelines set forth by the Legislature. The assistant secretary represents the department and the state on the Gulf of Mexico Fisheries Management Council which is responsible for the management of the fisheries resources in the Gulf's FCZ (Fisheries Conservation Zone). The Office of Coastal and Marine Resources is composed of the Seafood Division, the Aviation Section and Ecological Studies Section.

During 1984 the structure of the Seafood Division was changed significantly with the addition of the Saltwater Finfish Management Section and now contains 10 distinct sections: Administrative, Fisheries Management, Lyle S. St. Amant Marine Laboratory, Oyster Lease Survey, Seismic, Hydrological, Coastal Use Permits, LOOP (Louisiana Offshore Oil Port), Fish Kill and Saltwater Finfish Management.

The Aviation Section consists of three full-time pilots who play a vital role in department activities requiring aircraft, including enforcement patrols, waterfowl inventories, surveys of fishing activities, and oil spill and fish kill investigations.

The Ecological Studies Section is responsible for evaluating U.S. Army Corps of Engineers Section 10 and 404B permit applications, and reviewing and commenting on various environmental impact statements throughout Louisiana. This section also administers the state's Scenic Rivers System program and serves as a clearing house for information on endangered and threatened species.

Ecological Studies Section

The Ecological Studies Section is federally funded under the Dingell-Johnson and Pittman-Robertson acts. Many of the duties and responsibilities of this section are set forth in the technical assistance, research and survey agreement Federal Aid Project FW3 entitled "Statewide Environmental Investigations." During 1984, this section conducted several studies.

Study I: Environmental Investigations, Technical Assistance

Job I-1: Corps of Engineer Projects: Technical assistance in matters pertaining to fish and wildlife conservation and habitat value assessment, preservation, mitigation and compensation was rendered to the Army Corps of Engineers during the planning for and consideration of the following projects.

1. Red River Waterway Master Plan for Recreations—fish and wildlife mitigation; 2. Aloha-Rigolets Flood Control Project; 3. Chatelain Lake Canal Project; 4. Eastern Rapides, South Central Avoyelles Project; 5. Mississippi River Gulf Outlet; 6. Mississippi River Deep Draft Project; a. below Venice, b. Head of Passes to Baton Rouge; 7. Mississippi River Supplement II; 8. Maintenance Dredging Projects for a. Calcasieu, b. Southwest Pass, c. GIWW, d. Mermentau River, e. Atchafalaya River; 9. Estuarine Areas Study (Freshwater Diversion); 10. Coastal Areas Study (Freshwater Diversion); 11. Atchafalaya Basin—Environmental Modeling Study; 12. Port Bienville-Little Lake Project; 13. Lake Pontchartrain and Vicinity Hurricane Protection Project; 14. Louisiana Coastal Areas Study—Marsh and Barrier Island loss and erosion rates; 15. Boeuf River and Tributaries Study; 16. Tensas River Project; 17. Caddo Lake Study; 18. Bayou Bodcau Reservoir Study; 19. Larto-Saline Lakes Study; 20. Pearl River Navigation Feasibility Study.

Job I-2 U.S. Department of Agriculture: Technical assistance was given to the Soil Conservation Service and U.S. Forest Service concerning native fish and wildlife species and the potential effects actions of these two agencies will have on those species.

Those projects were: 1. Bayou Mallet Water Shed (W.S.); 2. Upper Vermilion W.S.; 3. Lake Verret W.S.; 4. Cameron-Creole W.S.; 5. Bayou Plaquemine Brule W.S.; 6. Mill Haven W.S.; 7. Village of Brusly Drainage Project; 8. Fifth Ward W.S.; 9. Walnut Roundaway W.S; 10. several RC&D projects.

Job I-3: Assisting other agencies: Several other federal, state and local agencies as well as private individu-

als and companies received technical assistance. The assistance was rendered either through direct one-on-one contact or via service on commissions and advisory panels. The groups and companies that were assisted during 1984 were: 1. Flood Plain Management Advisory Committee (member); 2. Water Resources Advisory Committee (member); 3. Louisiana Water Resources Information Center Task Force (member); 4. Office of State Parks; 5. Office of Surface Mining (DNR); 6. Federal Highway Administration; 7. Nuclear Waste Isolation State Advisory Committee (member); 8. Tenneco-LaTerre Mitigation Banking Plan; 9. Seminar on Wetlands Permitting (participant); 10. Recreation, Tourism and Wildlife Committee (member); 11. Lafourche Parish Levee Board; 12. Ascension Parish Police Jury; 13. Terrebonne Parish Police Jury; 14. Baton Rouge Port Commission; 15. Hydropower Generation Projects, various municipalities; 16. Big Burn Management Plan; 17. Toxic Substances Advisory Committee (member); 18. Gulf of Mexico Fishery Management Council, Habitat Advisory Panel (member); 19. HUD, Community Development Block Grants; 20. LDOTD, highway realignments and bridge replacements; 21. FAA, airport construction; 22. Defense Department, advice on military operations which could impact wildlife; 23. U.S. Coast Guard, impacts to fish and wildlife resources resulting from projects on navigable streams (i.e., bridges); 24. EPA, fish and wildlife population data, wetlands and bioassay data; 25. Louisiana Department of Justice, advice on damage to fish and wildlife resulting from illegal activities of various sorts.

Job I-4: Permitting of Various Governmental Agencies: Personnel of the Ecological Studies Section were involved in the review of several types of state and federal permits. These include U.S. Army Section 10 and 404B permits, state coastal use permits, NPDES waste discharge permits, air emissions permits, and permits for disposal of hazardous and solid wastes. The latter four types of permits are issued by the Department of Environmental Quality.

This section reviewed and commented upon approximately 2,500 404B and Section 10 permit applications 1,500 coastal use permit applications.

Job I-5: Scenic Rivers Permitting: The Ecological Studies Section is responsible for the receipt, review and final disposition of permits for activities occurring on or adjacent to our natural and scenic streams. Louisiana's Scenic Rivers System is the second largest system of its kind in the United States. During the year, 20 applications were received, 19 permits were issued and one was denied.

Other duties of the Ecological Studies Section include river and stream ecological surveys and endangered species conservation. During 1984 many endangered species consultations were held.

Aviation Section

With large expanses of Louisiana's coastal areas accessible only by boat or airplane, the Aviation Section plays a vital role in enforcement, wildlife and fisheries research, and management activities. This section maintains and operates six aircraft and has three full-time professional pilots, all of whom have twin-engine and IFR (Instrument Flight Rating) rating as well as single-engine land and sea ratings. During 1984 this section logged approximately 1,800 hours of flying time.

This section greatly enhanced the efficiency and effectiveness of the department's enforcement activities. Air reconnaissance for illegal gill nets and baited waterfowl ponds resulted in numerous citations and arrests. Also, this section assisted greatly in the department's efforts to stop illegal shrimping and oyster fishing activities; during critical periods shrimp and oyster patrols were flown daily. Additionally, air support played a significant role by assisting ground-based enforcement officers in apprehending illegal night hunters.

During the fall and winter, aerial waterfowl surveys are routinely conducted. In 1984 numerous oil spill investigations, fish kill investigations and fishing activity surveys were conducted. Additionally, monthly habitat inspection flights were conducted in conjunction with the LOOP (Louisiana Offshore Oil Port) and the DOE (U.S. Department of Energy) Calcasieu River/Lake Ecosystem surveys. These flights aid in documenting natural habitat changes as well as man-made alterations in conjunction with construction activities associated with these two projects. Also, numerous habitat inspections of activities associated with Army Corps of Engineers and coastal use permit were routinely conducted.

This section also routinely cooperates with local, state and federal authorities in surveillance activities throughout Louisiana. Also, the department's aircraft are made available during times of emergencies or natural disasters.

Seafood Division

Administrative Section

The Administrative Section controls the budgetary, personnel and policy function of the division; technical and administrative personnel also perform research and management activities. Division personnel serve as technical representatives to such organizations as the Gulf States Marine Fisheries Commission, Gulf of Mexico Fisheries Management Council, Governor's Saltwater Finfish Task Force, Task Force on Shrimp Management and Lott McIlwain Task Force. In addition, personnel reviewed and commented on several fisheries management plans for the FCZ (Fishery Conservation Zone) administered by the Gulf of Mexico Fisheries Management Council.

This section also administers and issues permits to persons engaged in various activities across the coast. During the year, 57 scientific collecting permits were issued to scientists and researchers to collect specimens using a variety of gear and techniques for scientific research and educational purposes. Additionally, 28 shrimp bait dealer permits were issued to bait dealers to harvest shrimp for live bait between the spring and fall inshore shrimp seasons. This section also issued and monitored 21 pompano permits and 45 underutilized species permits.

Lyle S. St. Amant Marine Laboratory

The primary function of the Lyle S. St. Amant Marine Laboratory on Grand Terre Island is to conduct research aimed at providing better management information for commercially and recreationally important marine species. The major research projects undertaken in 1984 include:

1. Spotted Seatrout and Red Drum—A monitoring project was undertaken to determine relative stock size, population fluctuation and distribution; evaluate the effects of environmental parameters on stocks; and increase the knowledge of habitat preference. Six sampling sites have been selected throughout the Barataria Bay system as a preliminary monitoring effort. The sites were paired on a north-south transect, so two different habitat types were sampled; one along the marshy shoreline and the other along an open water reef. The strike method of capture was employed using a 600-foot monofilament gill net with 1″, 2″, 3″ and 4″ stretch mesh. Environmental data (salinity and temperature) was collected at each of the sampling sites.

A recreational catch survey of the lower Barataria Estuary was conducted to obtain estimates of harvest and recreational effort and to describe temporal and spatial patterns of fishing pressure and distribution of fishermen in the system. The basic sampling period was a calendar month, and day-type was stratified with each month as weekday and weekend/holiday. The total area encompassed was 122,424 acres (191 square miles).

The objectives of a project entitled "Growth and Distribution of Young-of-the-Year Spotted Seatrout and Red Drum in Barataria Estuary" were to determine habitat differences and local distribution of juvenile spotted seatrout and red drum, monitor growth rates and develop a reasonable quantitative sampling methodology for assessing year-class strength. Samples were taken biweekly at 13 prescribed stations. Gear type used was a 20 × 6-foot minnow seine with ⅛-inch mesh. Sixty feet of shoreline was sampled at each station.

A study designed to age red drum to a year class using scales and otoliths as age determinants and to estimate growth with respect to year class was conducted. Red drum have been collected from Barataria Bay and adjacent waters using seines, pound net, trammel net, gill net, rotenone, and hook and line. Scales and otoliths were taken from each fish for age analysis. Annuli from scales were read from either the scale itself or an acetate impression of the scale's surface. Otoliths were sectioned, mounted on a slide and examined microscopically. Morphometric and age data were analyzed to generate growth estimates as related to year class.

2. Menhaden—Ichthyoplankton samples were taken at six sites along the Barataria Waterway. These stations were chosen to sample diversified environmental regimes. The objective of this study was to monitor larval fish movements with a particular emphasis on Gulf menhaden in response to these regimes. The ultimate goal of this study was to determine optimal salinity parameters for Gulf menhaden larvae and the larvae of other commercially important, estuarine-dependent species for making recommendations concerning freshwater diversions from the Mississippi River. This was the first year of an ongoing study.

Proposed research at the Marine Lab includes an electrophoretic study of the menhaden found in the Gulf of Mexico. The objectives of this study are twofold: to determine the phylogenetic relationship of the three species of menhaden found in the Gulf, and to determine if the population of the Gulf menhaden is composed of one or two subpopulations separated by the Mississippi River.

3. **Stone Crab**—Analysis of data collected during a study to compare stone crab catches of wire blue crab traps and plastic stone crab traps was completed in 1984. Results indicated that while plastic traps caught significantly higher numbers of stone crabs over a broad size range, there were no significant differences between the two trap types in the catch of large stone crabs. Large stone crabs were defined as those crabs having a claw length of 2¾ " or more (Florida's legal size). The results imply that in future studies on stock assessment of large, marketable stone crabs, the lighter, more manageable wire traps can be used.

A study comparing various tag types for stone crabs indicated the Floy sphyrion anchor tag was superior to the Floy dart tag in both survival and retention after molting. The techniques and methods developed in this study and the trap study will be used in future studies to assess the stone crab as a potential new fishery resource.

4. **Shrimp**—Brown shrimp emigrations from Barataria Bay to the Gulf of Mexico were intensively sampled with a stationary wing net. Results of the sampling, when correlated with environmental data, will increase the understanding of brown shrimp behavior. This will also aid in constructing a model for predicting mass emigrations of brown shrimp which will be useful in managing the species.

5. **Clams**—Research was conducted on the hard clam *Mercenaria campechiensis* to determine if the potential for a hard clam fishery exists in Louisiana. Hard clams were first successfully hatchery-spawned in Louisiana by biologists at the Marine Lab's oyster hatchery. Growth rate data for larval clams has been gathered in relation to salinity and temperature. Ongoing and future research will determine growth rate of seed clams and the time necessary for seed clams to reach harvest size.

6. **Oysters**—A system for setting oyster larvae on clamshell was designed, constructed and implemented in the spring of 1984. With only a small amount of time, money and equipment, nearly 400,000 oysters 12mm in length were produced in a seven-week period.

Operation of the state oyster hatchery and setting facility provided material for research into the dispersion of hatchery-reared larvae over state-owned oyster growing grounds, the staining of oyster larvae for spat identification and oyster genetics. Approximately 22.5 million oyster larvae were reared to the eyed ready-to-set stage and dispersed underwater over several state-owned reefs. After the first dispersion of 5 million larvae, indirect evidence indicated the set of larvae was excellent. A method of staining larval oysters was developed and applied to 12.5 million hatchery-reared larvae. After dispersion, direct evidence through identification of stained spat showed that eyed larvae can be hatchery-reared, dispersed on Louisiana reef areas and set successfully.

Genetic studies in conjunction with LSU were begun in an effort to identify inheritable factors and determine growth rates in oysters. One factor already determined is that oysters with more protein-enzyme variation grow faster.

Fisheries Management Section

Brown Shrimp Early in 1984, hydrological and biological sampling indicated brown shrimp production would be above that observed in 1983. While Mississippi River discharge rates were high and similar to those observed in 1983, the Bonne Carre Spillway was not opened, and coastal rainfall was well below 1983 levels. Average salinities in both the northern and southern portions of the nursery grounds were acceptable, and it was estimated there were approximately 1.6 million acres of optimum (above 10 ppt salinity) nursery area available. This was substantially above the 900,000 acres available during 1983. Additionally, April water temperatures were significantly above those observed during 1983.

Biological sampling during the spring of 1984 indicated that brown shrimp recruitment had responded favorably to the improved environmental conditions as trawl samples detected larger numbers of brown shrimp on the nursery grounds with larger average sizes than during 1983.

When the inshore shrimp season for Zone 1 (the area east of the Mississipi River) opened at 6 a.m. May 25, it was estimated only 25 percent of the shrimp were larger than 100 count (shrimp per pound) heads-on. Biological recommendations were that Zone 1 should open on June 6; however, as a result of legal interpretations, it was determined the seasons had to be opened no later than May 25. When the season opened, tides in Zone 1 were above normal, catches were less than expected, and the shrimp were much smaller than in recent years. It was estimated as much as 50 percent of the shrimp catch (by number) in Zone 1 was discarded due to its small size.

In Zone 2 the season opened at 6 a.m. May 21. Weather conditions and a significant tidal fluctuation associated with the full-moon phase of the lunar cycle during the four days preceding the opening of the season caused a significant movement of brown shrimp from the lower bays to the Gulf of Mexico. Catches of 60 to 75 barrels (210 pounds per barrel) of 70/80 to 100+ count shrimp were reported for 36 hours of trawling in the offshore areas of Zone 2, and 20 to 25 barrel catches were not uncommon. Some difficulties at processing facilities were reported due to the large volume of shrimp being unloaded on the weekend (May 19-20) and the fact a lot of boats were driven inshore at the same time due to deteriorating weather conditions.

When the season opened in Zone 2, weather conditions were such that fishing activity by many of the boats were adversely affected. Winds south-southeast at 20 to 25 mph caused lakes and bays to become extremely rough. Also, the southerly winds and approximately three inches of rain caused tides to be greatly above normal, and in many areas water was two to four inches deep in the marsh, allowing the shrimp to disperse throughout the system.

In Zone 3 the spring season opened at 6 a.m. May 25. At this time it was estimated only 14 percent of the brown shrimp were larger than 100 count. On opening day hydrological conditions were deteriorating from the 7" to 8" of rain that fell in the area May 21 and 22. This displaced part of the shrimp population in the northern portion of the system. Commercial fishermen opening day averaged 700 pounds of 120+ count brown shrimp and 100 pounds of 16/20 count white shrimp. By May 31, trawling effort in the area was substantially reduced as fishermen apparently chose to wait and let the 100+ count shrimp grow before trying to harvest them.

The fishing effort during the opening days of the spring season, particularly in the recreational segment, appeared to be below that observed in past years. Also, the high winds and above-normal tides adversely affected fishing effort and success.

White Shrimp White shrimp recruitment in Zones 2 and 3 began during the last week of June and first week of July. On July 5 and 6, sampling indicated white shrimp exceeded 10 percent of the population, thereby meeting the criteria necessary to close the spring season in Zones 2 and 3. On July 14 at 6 a.m. the spring season in Zones 2 and 3 was closed, with the exception that wing net fishing on outgoing tides was allowed until July 16 in the Calcasieu Ship Channel below Calcasieu Lake.

In Zone 1 white shrimp recruitment began during the week of July 8-14 and exceeded 10 percent of the population by the following week. The spring season in Zone 1 was closed at 6 p.m. July 28, with the exception of wing net fishing on outgoing tides in three small areas (Rigolets, Chef Menteur Pass and the Mississippi River-Gulf Outlet north of Bayou Bienvenue).

White shrimp recruitment continued in all three zones. Trawl samples taken during the last week of July indicate the number of white shrimp in the marsh was greater than that observed in 1983 for the same time period.

The 1984 fall shrimp season opened statewide at 12:01 a.m. Aug. 20 and closed at midnight Dec. 21 as prescribed by law.

Both the 1984 spring and fall shrimp seasons started slow; however, production increased as the season progressed. Preliminary statistics reported by the National Marine Fisheries Service (NMFS) indicate Louisiana landed 68,585,000 pounds of heads-off shrimp during 1984. This is substantially above the 45,404,000 landed during 1983.

Oyster Production Consistent monitoring of environmental conditions, oyster abundance, and fishing effort on the public seed grounds and reservations is essential to the effective management of Louisiana's oyster resources. Effective management in this case is best defined as allowing the maximum utilization of the resource in a given year while simultaneously protecting and enhancing the resource for the future.

During 1984 over one-half million barrels of oysters were taken from the public oyster seed grounds and reservations. Of this total, approximately 200,000 barrels came from the Cabbage Reef area in Mississippi Sound. Bay Gardene and the Breton Sound area together contributed over 250,000 barrels. Sister Lake and Calcasieu Lake produced about 65,000 and 50,000 barrels respectively. Oyster production from Hackberry Bay in 1984 was negligible.

Several management measures recommended by the Seafood Division and implemented by the Wildlife and Fisheries Commission during 1984 substantially increased the value of the oysters taken from the public seed grounds and reservations. "Bedding only" restrictions were placed on the Sister Lake reservation during September, and during September and October, on a portion of the public grounds in St. Bernard Parish which includes the Cabbage Reef area. In Sister Lake this action allowed for the bedding of over 50,000 barrels of seed onto private leases. The "bedding only" restriction also resulted in a superior meat yield of the oysters when the lake was opened for sacking in October. In the Cabbage Reef area the restriction allowed for the bedding of approximately 100,000 barrels of seed onto private leases. The oysters bedded during the restricted periods have had a stabilizing effect on the oyster industry and should ensure the availability of oysters well into 1985.

Oyster Shell Plants A shell plant consisting of 25,000 cubic yards of clam shell sprayed over 500 acres was conducted at Turkey Bayou in 1984. Subsequent biological sampling indicated that this plant was covered with spat and small seed oysters. This shell plant will be harvested in the fall of 1985. If environmental conditions remain favorable, production is expected to be substantial.

In 1984, three shell plants were conducted consisting of 15,000 cubic yards sprayed over 300 acres in Bay Gardene, 15,000 cubic yards over 300 acres in Black Bay east of Lonesome Island and 20,000 cubic yards over 400 acres in California Bay. Recent spat sets from early September to early November were recorded in the vicinity of these areas.

Shell plants were conducted in Coastal Study Area V in 1983 and 1984. Both shell plants consisted of approximately 25,000 cubic yards each. The 1983 shell plant covered 477 acres. Spat sets in June 1983 and the second week of activity by many of the boats were adversely affected. Winds south-southeast at 20 to 25 mph caused lakes and bays to become extremely rough. Also, the southerly winds and approximately three inches of rain caused tides to be greatly above normal, and in many areas water was two to four inches deep in the marsh, allowing the shrimp to disperse throughout the system.

Research and Monitoring During 1984, shrimp, bottomfish and blue crab populations and associated hydrological parameters were monitored at 105 stations in Louisiana's territorial waters (both inshore and offshore) in conjunction with the 88-309 Federal Aid Projects 2-394R and 2-412R.

Additionally, under projects 2-421R, oyster populations on public grounds and oyster seed reservations, as well as harvest estimates from these areas, were monitored. Oyster spatfall (density and timing) was monitored using spat collecting (Butler) plates while seed oyster and commercial sack oyster populations were monitored using a square meter frame and scuba. Harvest estimates were obtained from twice-weekly boating surveys of boats fishing on the public grounds and oyster seed reservations.

Project 2-412R also included a coastwide access point finfish creel survey. This survey interviewed finfishermen at every boat launch in coastal Louisiana and was the most comprehensive access point finfish survey ever conducted in coastal Louisiana.

In 1984, Louisiana continued collecting fishery dependent data as a result of a cooperative statistical agreement signed with NMFS under the State-Federal Statistics initiative. Data was gathered on king mackerel, black drum, striped mullet, brown shrimp and white shrimp. Sampling efforts for king mackerel and other coastal pelagic fisheries were centered in Grand Isle while black drum and striped mullet sampling was centered east of the Mississippi River. The shrimp sampling was conducted in Terrebonne and Lafourche parishes.

Section personnel have also been cooperating with the Department of Health and Human Resources and LSU Department of Experimental Statistics in a project designed to model water quality data from Louisiana's oyster producing areas. This project involves (1) contacting all state and federal agencies which gather water quality data or hydrological data in Louisiana's coastal waters, (2) locating all known sources of fecal coliform contamination which may impact the oyster growing areas, (3) collecting the available data and developing a data base which has the data in a uniform format, (4) developing a computer model which will predict the movement of waters which may be contaminated, and (5) developing the administrative and statutory ability to quickly open and close areas based on the results obtained from the model.

This section also coordinates numerous federal grants and contracts, including the 88-309 program (fisheries research and development), Saltonstall-Kennedy program, Wallop-Breaux program, CZM (Louisiana Coastal Zone Management), DOE (U.S. Department of Energy), LOOP (Louisiana Offshore Oil Port) and the state-federal fisheries statistics project.

Through research efforts of this section, forecast models for commercial catches of Gulf menhaden have been developed. These predictive models are based on abundance of juvenile menhaden taken in the shrimp monitoring trawl samples and on hydrological-climatological data such as salinity, temperature and river discharge. Annual meetings are held with representatives of the menhaden industry to present catch forecast and discuss other information relative to the menhaden industry, which is the largest volume fishery North America. Additionally, personnel of this section conducted a shrimp mark-recapture project in Lake Pontchartrain. This project was designed to provide migration information on brown shrimp in the Lake Pontchartrain system.

Saltwater Finfish Management Section

During 1984, as a result of the governor's Saltwater Finfish Task Force and Act 295 of the Legislature, a Saltwater Finfish Management Section was authorized and established within the Seafood Division. Staffing and equipping this section was initiated in 1984.

Objectives for this section include (a) development of a management plan for finfish (particular emphasis on spotted seatrout and red drum) which will insure proper allocation of the resource while providing for the continuance of the species, (b) establishment of a coastwide monitoring program yielding specific information concerning catch of commercial and recreational fishermen, (c) cooperative studies (with universities, other states, consultants, etc.) to define larval movement and transport, estuarine dependence and effect of environmental fluctuations, and development of predictive models for marine finfish, and (d) development of management recommendations for the Legislature.

Hydrological Management Section

The operation, maintenance and data processing of the 15 coastwide continuous recorder meter stations were accomplished during the year. Parameters measured by these meters included conductivity, salinity, water temperature, rainfall, tide and wind, and current velocities. These data were used in the correlation of oyster contamination with environmental parameters, habitat mapping, and determination of estuarine water characteristics as they relate to shrimp harvest.

As in recent years, hypoxia was noted with the occurrence of summer water stratification. However, the extent of the hypoxia zone was not as large as it had been.

Work was begun on the use of the Map Overlay and Statistical System (MOSS) developed by the National Coastal Ecosystems Team of the U.S. Fish and Wildlife Service. This system is used for mapping biological and environmental parameters and measurements of land and water areas.

SEAMAP The department's participation in the state-federal cooperative Southeast Area Monitoring and Assessment Program (SEAMAP) continued for the third year. Representatives of each state along the Gulf of Mexico and the National Marine Fisheries Service (NMFS) coordinated the 1984 SEAMAP monitoring program and funding requests for the 1985 program. With federal funds available in 1985, Louisiana will increase its participation to include sampling in offshore waters to 15 fathoms.

Monitoring activities in nearshore waters of each coastal study Area were completed in June and July 1984 in conjunction with sampling done further offshore by the NMFS research vessel. Communities sampled by the department included demersal nekton, ichthyoplankton and zooplankton. The environmental parameters (i.e., salinity, water temperature, dissolved oxygen and chlorophyll concentrations) were also determined.

Ichthyoplankton and zooplankton were sampled again in each coastal study area in October and November in conjunction with offshore samples taken by NMFS. The environmental parameters, salinity and water temperature were also measured.

Department personnel examined the sorted ichthyoplankton samples collected in the Gulf of Mexico off Louisiana in conjunction with 1982 SEAMAP activities. Specimens were identified as to species and length measurements were taken.

DOE/CALECO During the year the department entered into an agreement with the U.S. Department of Energy for a three-year study of pollution loading and environmental characterization of the Calcasieu River/Lake ecosystem. Administrative and technical review functions for this project reside in Seafood Division's Hydrological Management Section, including intra-agency coordination for dissemination of research findings to resource management personnel.

Monthly habitat inspection flights of the study area were made. Performance of the research has been subgranted to McNeese State University. An element of the research, an effort to model hydrologic processes in relation to biotic communities, will be performed by a research team from the University of South Carolina.

The project schedule requires (1) preparation and approval of a research plan, (2) a two-year field investigation period and (3) preparation of a final report due in June 1986. The research plan, as approved, called for monthly sampling of diverse habitats throughout the Calcasieu Basin from the saltwater barrier above Lake Charles to Calcasieu Pass over the two-year field investigation phase. Additionally, intensive sampling (repeated observations made over a 48-hour period) was done on a quarterly basis at selected locations. Emphasis for the intensive sampling effort changes from the northern basin to the southern during the second year of the field investigation. The first year's sample data have now been collected and the department has reviewed preliminary results.

LOOP

The department's environmental monitoring effort for the Louisiana Offshore Oil Port (LOOP) continued into its seventh year. Estuarine and offshore habitats in the vicinity of LOOP facilities and along the pipeline corridors were sampled regularly to determine potential impact from project operations and to contribute to the data base for use in long-range resource planning.

Shrimp and bottom fish, zooplankton and benthic communities were sampled in conjunction with water and sediment samples for characterization of local habitat. Constant records of water temperature, salinity, current velocity and tide level were also made, as were monthly flights to inspect LOOP and ancillary pipeline corridors and facilities. Work continued toward completion of the final report for the first four years of the monitoring program.

During the year, analyses of zooplankton and benthic data indicated that decreases in sampling intensity were appropriate. The zooplankton sampling effort was then redistributed to gather information across the continental shelf from the LOOP offshore terminal to the beach. This sampling was taken in conjunction with monthly cross-shelf hydrographic profiles.

Department personnel also participated in oil-spill contingency planning and in investigations of small oil spills in the vicinity of the Clovelly Dome storage facility and offshore near the marine terminal. No significant adverse impact of these spills was found.

Oyster Lease Survey Section

During 1984 this section was expanded with the addition of a third survey team. The section surveyed 715 oyster leases of a total of 1,187 applications for survey. There were 398 applications which could not be surveyed due to bad weather and low tides, and 74 applicants failed to show up for surveys. Also, this section surveyed five shellplants and "tied in" and plotted 45 monuments. In addition, the drafting unit in this section has aided the Department of Health and Human Resources in drafting oyster closure lines and preparing maps.

This section also assisted the Fur and Refuge Division in surveying boundaries for the Salvador Wildlife Management Area and additional land for the Seafood and Fur and Refuge office in New Iberia.

During 1984 this section sold 1,400 tonnage licenses, 1,040 dredging licenses, and 92 oyster shop and resale licenses as well as processing and issuing 448 leases.

Seismic Section

Seismographic exploration, the measuring of shock waves created by discharging an energy source, is the tool used by the oil and gas industry in its exploration activities to locate potential reserves. Research has indicated some seismographic activities may adversely impact the fish and wildlife resources of the state. In order to effectively monitor these activities, a regulatory process was established and is administered within the Seafood Division.

Seismic companies operating within the state must first obtain a permit from the department. Seismic agents employed by the department are assigned to each field operation and prepare weekly reports on the seismic companies' operations. These reports include information on the activities of the companies' survey crews, the discharge of explosives or other energy sources used to create the shock waves, and daily records on the number of charges fired, depth fired and impact on habitat and fish and wildlife resources.

In 1984 the Wildlife and Fisheries Commission revised the rules governing seismic operations and increased fees paid to the department by the seismic companies. During the year 50 seismic crews were permitted to work in the state.

Fish Kill Section

The Fish Kill Section investigated a total of 13 kills from Jan. 1 to Nov. 21, 1984. Of these, 61.5 percent were mainly due to low dissolved-oxygen concentrations, while low D.O. levels and high ammonia combined, herbicide contamination, excessive salinity, rapid temperature drop, and a combination of anoxic water, exceedingly high hydrogen sulfide, ammonia and carbon dioxide concentrations made up the remaining 38.5 percent.

During the year an article on natural causes of fish kills for the *Louisiana Conservationist* (July-August issue) and six special reports were prepared. These reports included a report on fish and oyster mortalities that occurred in Coastal Study Area I - VII; an in-depth report on the numerous effects of low temperatures on fish and the fish kills that occurred during December 1983 and January 1984 in coastal Louisiana; an investigation of a water body where two massive fish kills had occurred previously; an analysis of water quality data from Lake Pontchartrain; a special report dealing with the testing of various standard solutions with a HACH DR-EL/4; and an analysis of the water at Bayou Plaza (at the Louisiana World Exposition) to determine suitability for stocking fish.

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